

Prof. Debatosh Guha
FASc, FNAE, FNASc, FIEEE
Abdul Kalam Technology
Innovation National Fellow



Professor
Institute of Radio Physics and Electronics
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Debatosh Guha is a Professor in Radio Physics and Electronics, University of Calcutta. He is the former HAL Chair Professor of IIT Kharagapur and former Director of the Centre for Research in Nanoscience and Nanotechnology (CRNN), University of Calcutta. He is Abdul Kalam Technology Innovation National Fellow of INAE/DST-SERB. He has made some fundamental contributions to microstrip and dielectric resonator antenna techniques for the new generation radar and airborne applications. His techniques are being used by several industries including the R&D Labs of ISRO and American National Center for Atmospheric Research. He has also closely worked with industries and has several patents to his credits. He has published more than 200 technical papers in the leading journals and conferences and a reference book on Antennas from Wiley, UK. His research contributions are frequently cited by other researchers showing h-index 33 with a record of more than 3500 citations. His research results have already been featured in 35 books and handbooks.

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Education

- Ph. D. (Tech.) in Radio Physics and Electronics, University of Calcutta (1994)
- M. Tech. in Radio Physics and Electronics, University of Calcutta (1988), 1st Class with Rank-1
- B. Tech. in Radio Physics and Electronics, University of Calcutta (1986), 1st Class
- B. Sc. (Honours in Physics), University of North Bengal (1984), 1st Class with Rank-1

Employment

- Full Professor, University of Calcutta (July 2008- present)
- Head, Institute of Radio Physics & Electronics, CU (Dec. 2016- Nov. 2018)
- Director, Centre for Research in Nanoscience and Nanotechnology, CU (Sept. 2017- Sept. 2019)
- HAL Chair Professor, IIT Kharagpur (2015-2016)
- Visiting Research Professor, Royal Military College of Canada, Ontario (2004-2006)

Fellowships

- Fellow of Indian Academy of Sciences (2021)
- Abdul Kalam Technology Innovation National Fellow by INAE-SERB/DST (2020)
- Fellow of IEEE (2017)
- Fellow of the National Academy of Sciences, India (2015)
- Fellow of Indian National Academy of Engineering (2013)
- Fellow of West Bengal Academy of Science and Technology (2015)
- Fellow of Inst. of Electronics & Telecommunication Engineers (2012)

Awards

- Acharya P C Ray Memorial Award by the Institute of Pulmocare and Research (IPCR), Kolkata (<https://www.youtube.com/watch?v=vmivFedlq1I>)
- IETE Ram Lal Wadha Award (New Delhi, 2016)
- IEEE AP-Society's Raj Mitra Travel Grant Award (Chicago, 2012)
- URSI Young Scientist Award (Lille, France, 1996)

Industry Collaborations and Patents

Prof. Guha has been collaborating with the leading industries of home and abroad:

- (i) **Spotwave (www.spotwave.com), Canada** (developed high gain base station antenna- transformed to a commercial product Model No. Z1900 in 2007).
- (ii) **American National Centre for Atmospheric Research (NCAR), Boulder** (helped developing advanced array antennas for new generation weather radars).
- (iii) **Indian Space Research Organization (ISRO)** (developing advanced dielectric antennas for space applications).

Recent patents:

Appl.201731000973: Novel DRA and array structures to avoid adhesive or glue.

Appl.201831003527: A millimeter wave horn antenna.

Appl.201831037619: A Substrate Integrated Waveguide based Multi-Horn Antenna

Appl.201931008444: Reduced Cross Polarized Radiations over Entire Skewed Radiation Planes.

International & National Committees

- IEEE AP-S Member and Geographic Activities (MGA) Committee (2021)
- Chair, Commission B of Indian National Committee for URSI, INSA (2015-2020)
- IEEE Fields Award Committee for AP-S (2018-2019)
- INSA Joint National Committee for COSPAR-URSI-SCOSTEP (2016-2020)
- Expert Committee of MeitY/DST, Govt. of India
- Vice-President, West Bengal Academy of Science and Technology (2017-2020)
- Vice-Chair, IEEE India Council (2016-2017)
- Chairman, IEEE Kolkata Section (2013-2014)
- Founding Chair, IEEE AP-MTT Kolkata Chapter (2004)

Leadership in Academic Programmes

- Commission-B Lead: URSI Asia Pacific radio Science Conference (AP-RASC) 2019
- Founding Leader: Indian Conference on Antennas and Propagation (InCAP) 2018
- Founding Chair and Course Director: Advanced School of Antennas (ASA) 2018, 2019
- IEEE Applied Electromagnetics Conference: Founding Chair 2007; General Chair 2009, 2011.
- IEEE Indian Antenna Week (International Workshop): Founding Chair 2010; General Chair 2011
- General Chair: IEEE Conference CALCON, Kolkata, India (2014)
- General Co-Chair: IEEE AP-S Industry Initiatives Committee Workshop, Ahmedabad, (2015)
- Asia Liaison, 8th European Conf. EUCAP, Hague, The Netherlands (2014)
- International Advisory/ Program Committee: ACME, Italy (2014); iWAT, Australia (2014); IMaRC, India (2013); 34th PIERS, Sweden (2013); ACME, Finland (2013); URSI- EMTS, Japan (2013); Asia Pacific Conf. Antennas & Propagation, Singapore (2012)

Selected Foreign Assignments (2011-2020)

- Waterloo Institute of Nanotechnology, Waterloo, Canada (Executing MoU as Director, CRNN)
- Royal Military College of Canada (Visiting Professor)
- URSI-GASS, Montreal, Canada (India representative to URSI Commission-B)
- IEEE Antennas and Propagations Symposium, San Diego, USA (IEEE Fellow felicitation)
- URSI-AP-RASC 2016, Seoul, Korea (Invited Speaker)
- Japan Radio Science Meeting, Tokyo, Japan (Keynote Speaker)
- Karlsruhe Institute of Technology (KIT), Germany (Visiting Scientist)
- Microwave and Millimeterwave Laboratory, City University, Hong Kong (Visiting Scientist)
- IEEE Section Congress, Amsterdam, Netherlands (as Chair of IEEE local Section)
- IEEE Antennas & Propagations Symposium, Memphis, USA (receive IEEE award/present paper)
- San Diego State University, California, USA (Visiting Scientist)
- Royal Military College of Canada (Visiting Professor)
- IEEE R-10 Meet, Chaing Mai, Thailand (as Chair of IEEE local Section).
- Antennas and Propagations Symposium, Chicago (to receive RMTG Award)
- University of Edmonton, Alberta, Canada (Invited Speaker)

Book Authored/Edited

D. Guha and Y. Antar, Ed. “**Microstrip and Printed Antennas**”, Wiley, UK, 2011.

Teaching Areas

Microwave and Millimeterwave Antennas; Antenna Engineering; Transmission Lines and Waveguides; Video and Multimedia Engineering.

Research Areas

Defected Ground Structures (DGS) for antenna applications; Dielectric Resonator Antennas with unconventional modes and feeding structures; improving cross-polarization issues of printed antenna and arrays; Resonance Gain Antenna: new theory for pattern synthesis and advanced feed design.

Ph. D. Supervised

20 (awarded: 15 and under progress: 5)

Research Publication in Journals and Conferences: 200+

Journals Papers: (IEEE 63; IEE/IET 7; Elsevier/Wiley etc.17)

1. K. Dutta, P. Mishra, S. manna, A. Pal, and **D. Guha**, "Geometrical Optics Based Advanced Design of an Open Cavity Resonant Antenna," *IEEE Trans. Antennas Propagat.*, (2021, in press).
2. C. Sarkar, **D. Guha**, and C. Kumar, "Hybrid Subarray Using a New Concept of Feed for Advanced Antenna and Array Designs," *IEEE Trans. Antennas Propagat.*, (2021, in press).
3. C. Kumar, and **D. Guha**, "Higher Mode Discrimination in a Rectangular Patch: New Insight Leading to Improved Design with Consistently Low Cross-Polar Radiations," *IEEE Trans. Antennas Propagat.*, (Available at IEEE early access DOI 10.1109/TAP.2020.3016506, in press).
4. C. Kumar and **D. Guha**, "Mitigating Backside Radiation Issues of Defected Ground Structure Integrated Microstrip Patches," *IEEE Antennas and Wireless Propagation Lett.*, (Available at IEEE early access DOI 10.1109/LAWP.2020.3037219, in press).
5. I. Pasha, C. Kumar, and **D. Guha**, "Mitigating High Cross-Polarized Radiation Issues over the Diagonal Planes of Microstrip Patches," *IEEE Trans. Antennas Propagat.*, vol. 68, no. 6, pp. 4950-4054, June 2020.
6. S. Choudhury, A. Mohan, P. K. Mishra, and **D. Guha**, "Reconfigurable Dual-Fed Horn with Pattern Switchability Realized by SIW Technology," *IEEE Trans. Antennas Propagat.*, Vol. 68 , No. 5, pp. 4072-4076, May 2020.
7. B. P. Kumar, **D. Guha**, and C. Kumar, "Reduction of Beam Squinting and Cross-Polarized Fields in a Wideband CP Element," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 19, No. 3, pp. 418-422, March 2020.
8. P. Gupta, **D. Guha**, and C. Kumar, "Higher Mode Based Wideband Antenna Design Using an Engineered Cylindrical Dielectric Resonator," *IET Microwaves, Antennas and Propagations*, Vol. 14, No. 4, pp. 241-246, March 2020.
9. D. Ganguly, **D. Guha**, and Y. Antar, "Cross-Finned UWB Monopole for Wireless Applications: Design Insight and Characterization," *AEÜ-Int. J. Electronics and Communications*, Vol. 116, March 2020.
10. C. Kumar and **D. Guha**, "Asymmetric and Compact DGS Configuration for Circular Patch with Improved Radiations," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 19, No. 2, pp. 355-357, Feb. 2020.
11. D. Dutta, Sk Rafidul, **D. Guha**, and C. Kumar, "Suppression of Cross-Polarized Fields of Microstrip Patch across All Skewed and Orthogonal Radiation Planes," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 19, No. 1, pp. 99-103, Jan. 2020.
12. C. Sarkar, C. Kumar, and **D. Guha**, "A User Friendly Glueless Solution for Dielectric Resonator Antenna using Probe Feeding Technique," *IEEE Antennas Propagat. Mag.* Vol. 61, No. 4, pp. 70-74, Aug. 2019.
13. S. Choudhury, A. Mohan, P. Mishra, and **D. Guha**, "Wideband Pyramidal Ridged Horn Design by SIW Technology," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 18, No. 7, pp. 1517-1521, June 2019 .
14. I. Pasha, C. Kumar, and **D. Guha**, "Application-Friendly Improved Designs of Single-Fed Circularly Polarized Microstrip Antenna," *IEEE Antennas Propagat. Mag.* Vol. 61, No. 3, pp. 80-89, June 2019.
15. I. Pasha, C. Kumar, and **D. Guha**, "Simultaneous Compensation of Microstrip Feed and Patch by Defected Ground Structure for Reduced Cross- Polarized Radiation," *IEEE Trans. Antennas Propagat.*, vol. 66, no. 12, pp.7348-7352, Dec. 2018.
16. C. Sarkar, **D. Guha**, C. Kumar, and Y. Antar, "New Insight and Design Strategy to Optimize Cross-Polarized Radiations of Microstrip Patch over Full Bandwidth by Probe Current Control," *IEEE Trans. Antennas Propagat.*, Vol. 66, No. 8, pp. 3902-3909, Aug. 2018.
17. S. Choudhury, A. Mohan, and **D. Guha**, "Wideband Quasi Omnidirectional Planar Inverted F-Antenna for Compact Wireless Systems," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 17, no. 7, pp. 1305-1308, July 2018.

18. S. Choudhury, A. Mohan, and **D. Guha**, "SIW-Induced Dualmode Dualband Loop Antenna: A New Design Insight and Guideline," *Microwave and Optical Technol. Lett.*, Vol. 60, no. 1, pp. 50-56, Jan. 2018.
19. C. Sarkar, **D. Guha**, and C. Kumar, "Glueless Compound Ground Technique for Dielectric Resonator Antenna and Arrays," *IEEE Antennas Wireless Propagation Lett.*, Vol. 16, pp. 2440-2443, 2017.
20. K. Dutta, **D. Guha**, and C. Kumar, "Theory of Controlled Aperture Field for Advanced Superstrate Design of a Resonance Cavity Antenna with Improved Radiations Properties," *IEEE Trans. Antennas Propagat.*, Vol. 65, no. 3, pp. 1399-1403, March 2017.
21. **D. Guha**, D. Ganguly, S. George, C. Kumar, M. T. Sebastian, and Y. Antar, "New Design Approach for Hybrid Monopole to Achieve Increased Ultra-Wide Bandwidth," *IEEE Antennas Propagat. Mag.* pp. 139-144, Feb. 2017.
22. C. Kumar and **D. Guha**, "Asymmetric Geometry of Defected Ground Structure for Rectangular Microstrip: A New Approach to Reduce its Cross-Polarized Fields," *IEEE Trans. Antennas Propagat.*, Vol. 64, No. 6, pp. 2503-2506, June 2016.
23. H. Gajera, **D. Guha**, and C. Kumar, "New Technique of Dielectric Perturbation in Dielectric Resonator Antenna to Control the Higher Mode Leading to Reduced Cross-Polar Radiations," *IEEE Antennas Wireless Propagation Lett.*, Vol. 15, pp. 445-448, 2016.
24. C. Kumar, I. Pasha, and **D. Guha**, "Defected Ground Structure Integrated Microstrip Array Antenna for Improved Radiation Properties," *IEEE Antennas Wireless Propagation Lett.*, Vol. 15, pp. 310-312, 2016.
25. K. Dutta, **D. Guha**, and C. Kumar, "Synthesizing Aperture Fields over the Superstrate of Resonance Cavity Antenna for Modifying its Radiation Properties," *IEEE Antennas Wireless Propagation Lett.*, Vol. 15, pp. 1677-1680, 2016.
26. P. Gupta, **D. Guha**, and C. Kumar, "Dielectric Resonator Working as Feed as well as Antenna: New Concept for Dual Mode Dualband Improved Design," *IEEE Trans. Antennas Propagat.*, Vol. 64, No. 4, pp. 1497-1502, Apr. 2016.
27. **D. Guha** and C. Kumar, "Microstrip Patch versus Dielectric Resonator Antenna Bearing all Commonly Used Feeds: Experimental Investigations to Determine the Appropriate One Based on Practical Requirements" *IEEE Antennas Propagat. Mag.*, Vol. 58, No. 1, pp. 45-55, Feb. 2016.
28. **D. Guha**, C. Sarkar, S. Dey, and C. Kumar, "Wideband High Gain Antenna Realized from Simple Unloaded Single Patch," *IEEE Trans. Antennas Propagat.*, Vol. 63, No. 10, pp. 4562 - 4566, 2015.
29. S. Biswas, **D. Guha**, and C. Kumar, "Design of Aperture-Coupled Dielectric Resonator Antenna Free From Higher Order Modes and Harmonics," *Microwave Opt. Technol. Lett.* Vol. 57, No. 8, pp. 1980-1983, Aug. 2015.
30. **D. Guha**, H. Gajera, and C. Kumar, "Perturbation Technique to Improve Purity of Modal Fields in Dielectric Resonator Antenna Resulting in Reduced Cross-Polarized Radiation," *IEEE Trans. Antennas Propagat.*, Vol. 63, No. 7, pp. 3253 – 3257, July 2015.
31. C. Kumar and **D. Guha**, "Reduction in Cross-Polarized Radiation of Microstrip Patches using Geometry Independent Resonant-type Defected Ground Structure (DGS)," *IEEE Trans. Antennas Propagat.*, Vol. 63, No. 6, pp. 2767 – 2772, June 2015.
32. K. Dutta, **D. Guha**, C. Kumar, Y. Antar, "New Approach in Designing Resonance Cavity High Gain Antenna Using Nontransparent Conducting Sheet as the Superstrate," *IEEE Trans. Antennas Propagat.*, Vol. 63, No. 6, pp. 2807 – 2813, June 2015.
33. **D. Guha**, H. Gajera, and C. Kumar, "Cross-Polarized Radiation in a Cylindrical Dielectric Resonator Antenna: Identification of Source, Experimental Proof, and Its Suppression," *IEEE Trans. Antennas Propagat.*, Vol. 63, No. 4, pp. 1863 – 1867, Apr. 2015.
34. C. Kumar, M. I Pasha, and **D. Guha**, "Microstrip Patch with Non-Proximal Symmetric Defected Ground Structure (DGS) for Improved Cross-Polarization Properties over Principal Radiation Planes," *IEEE Antennas Wireless Propagation Lett.*, Vol. 14, pp. 1412 – 1414, 2015.
35. **D. Guha**, P. Gupta, and C. Kumar, "Dualband Cylindrical Dielectric Resonator Antenna Employing HEM₁₁₆ and HEM₁₂₆ Modes Excited by New Composite Aperture," *IEEE Trans. Antennas Propagat.*, Vol. 63, No. 1, pp. 433 – 438, Jan 2015.
36. **D. Guha**, A. Bnaerjee, C. Kumar, Y. M. M. Antar, and M. T. Sebastian, "Design Guideline for Cylindrical Dielectric Resonator Antenna Using Recently Proposed HEM₁₂₆ Mode" *IEEE Antennas and Propagation Mag.* , Vol. 56, No. 4, pp. 148-158, Aug. 2014.
37. D. Ganguly, **D. Guha**, S. Das, and A. Rojatar, "Systematic Approach to Estimating Monocycle Pulse for Time Domain Studies of UWB Antennas Using Numerical Computations and Simulation Tools" *IEEE Antennas and Propagation Mag.*, Vol. 56, No. 4, pp. 73-87, Aug. 2014.

38. **D. Guha**, A. Banerjee, C. Kumar, and Y. Antar, "New Technique to Excite Higher Order Radiating Mode in a Cylindrical Dielectric Resonator Antenna," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 13, pp. 15-18, 2014.
39. C. Kumar and **D. Guha**, "Defected Ground Structure (DGS)-Integrated Rectangular Microstrip Patch for Improved Polarization Purity with Wide Impedance Bandwidth," *IET Microwaves, Antennas and Propagations*, Vol. 8, No. 8, pp. 589-596, June 2014.
40. **D. Guha**, S. Biswas, and C. Kumar, "Printed Antenna Designs Using Defected Ground Structures: A Review of Fundamentals and State-of-the-Art Developments," *Forum for Electromagnetic Research Methods and Application Technologies (FERMAT)*, Vol. 2, pp. 1-13, Mar-Apr-007, 2014.
41. S. Biswas, **D. Guha**, and C. Kumar, "Control of Higher Harmonics and Their Radiations in Microstrip Antennas Using Compact Defected Ground Structures," *IEEE Trans. Antennas Propag.*, Vol. 61, No. 6, pp. 3349-3353, June 2013.
42. S. Biswas and **D. Guha**, "Isolated open-ring defected ground structure to reduce mutual coupling between circular microstrips: characterization and experimental verification," *Progress in Electromagnetics Research M*, Vol. 29, pp. 109-119, 2013.
43. S. Biswas and **D. Guha**, "Stop-Band Characterization of an Isolated DGS for Reducing Mutual Coupling between Adjacent Antenna Elements and Experimental Verification for Dielectric Resonator Antenna Array," *AEÜ-Int. Journal Electronics and Communications*, Vol. 67, pp. 319-322, 2013.
44. C. Kumar and **D. Guha**, "Linearly polarized elliptical microstrip antenna with improved polarization purity and bandwidth characteristics," *Microwave Opt. Technol. Lett.* Vol. 54, No. 10, pp. 2309-2314, Oct. 2012.
45. **D. Guha**, B. Gupta, C. Kumar and Y. Antar, "Segmented Hemispherical DRA: New Geometry Characterized and Investigated in Multi-Element Composite Forms for Wideband Antenna Applications," *IEEE Trans. Antennas Propag.*, Vol. 60, No. 3, pp. 1605-1610, March 2012.
46. C. Kumar and **D. Guha**, "Nature of Cross-Polarized Radiations from Probe-Fed Circular Microstrip Antennas and Their Suppression Using Different Geometries of Defected Ground Structure (DGS)," *IEEE Trans. Antennas Propag.*, Vol. 60, No. 1, pp. 92-101, Jan. 2012.
47. **D. Guha**, A. Banerjee, C. Kumar and Y. M. M. Antar, "Higher Order Mode for High Gain Broadside Radiation from Cylindrical Dielectric Resonator Antennas," *IEEE Trans. Antennas Propag.* Vol. 60, No. 1, pp. 71-77, Jan. 2012.
48. **D. Guha**, Bidisha Gupta, and Y. M. M. Antar, "Hybrid Monopole-DRA's using Hemispherical/ Conical-Shaped Dielectric Ring Resonators: Improved Ultra-Wideband Designs," *IEEE Trans. Antennas Propag.* Vol. 60, No. 1, pp. 393 – 398, Jan. 2012.
49. **D. Guha**, S. Chattopadhyay, and J. Y. Siddiqui, "Easy Technique to Estimate and Physical Insight into the Gain Enhancement of a Microstrip Antenna Replacing PTFE by Air Substrate" *IEEE Antennas and Propagation Magazine*, Vol. 52, no. 3, pp. 92-95, June, 2010.
50. **D. Guha**, Y. Antar, P. Beland, and M. Roper, "A Small Size, High Gain Printed Antenna for Wireless Base Station Applications" *Microwave Journal* , Vol. 53, No. 1, p. 92, Jan. 2010.
51. **D. Guha**, C. Kumar, and S. Pal, "Improved Cross-Polarization Characteristics of Circular Microstrip Antenna Employing Arc-Shaped Defected Ground Structure (DGS)" *IEEE Antennas and Wireless Propagation Letters*, Vol. 8, pp. 1367-1369, Dec. 2009.
52. **D. Guha**, B. Gupta, and Y. Antar, "New Pawn-Shaped Dielectric Ring Resonator Loaded Hybrid Monopole Antenna for Improved Ultra-Wide Bandwidth," *IEEE Antennas and Wireless Propagation Letters*, Vol. 8, pp. 1178-1181, Dec. 2009.
53. S. Chattopadhyay, M. Biswas, J. Y. Siddiqui and **D. Guha** "Input impedance of rectangular microstrip with variable air gap and varying aspect ratio", *IET Microwaves, Antennas and Propagations*, Vol. 3, No. 8, pp. 1151-1156, Dec. 2009.
54. L. C. Chu, **D. Guha**, and Y. Antar, "Conformal Strip-Fed Shaped Cylindrical Dielectric Resonator: Improved Design of a Wideband Wireless Antenna," *IEEE Antennas and Wireless Propagation Letters*, Vol. 8, pp. 482-485, Dec. 2009.
55. S. Chattopadhyay, M. Biswas, J. Y. Siddiqui and **D. Guha** "Rectangular Microstrip Patch on a Composite Dielectric Substrate for High-Gain Wide-Beam Radiation Patterns", *IEEE Trans. Antennas Propag.*, Vol. 57, NO. 10, pp. 3325-3328, Oct. 2009.
56. S. Chattopadhyay, M. Biswas, J. Y. Siddiqui and **D. Guha**, "Rectangular microstrips with variable air gap and varying aspect ratio: Improved formulations and experiments" *Microwave and Opt. Technology Letters*, Vol. 51, No. 1, pp. 169-173, January, 2009.

57. M. Biswas and **D. Guha** "Input Impedance and Resonance Characteristics of Superstrate Loaded Triangular Microstrip Patch", *IET Microwaves, Antennas and Propagations*, Vol. 3, No. 1, pp. 92-98, January, 2009.
58. **D. Guha**, S. Biswas, T. Joseph and M. T. Sebastian, "Defected ground structure to reduce mutual coupling between cylindrical dielectric resonator antennas", *IEE Electronics Letters*, Vol. 44, No. 14, pp.836 – 837, 3rd July 2008.
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61. **D. Guha** and Y. M. M. Antar, "New half-hemispherical dielectric resonator antenna for broadband monopole-type radiation," *IEEE Trans. Antennas Propagat.*, Vol. 54, NO. 12, pp. 3621-3628, Dec. 2006.
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64. **D. Guha**, S. Biswas, M. Biswas, J. Y. Siddiqui and Y. M. M. Antar, "Concentric Ring Shaped Defected Ground Structures for Microstrip Circuits and Antennas" *IEEE Antennas and Wireless Propagation Letters*, Vol. 5, pp. 402-405, Dec. 2006.
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66. **D. Guha**, Y. M. M. Antar, A. Ittiboon, A. Petosa, and D. Lee "Improved design guidelines for the ultra wideband monopole-dielectric resonator antenna," *IEEE Antennas and Wireless Propagation Letters*, Vol. 5, pp. 373-376, Dec. 2006.
67. **D. Guha** and Y. M. M. Antar, "Circular microstrip patch loaded with balanced shorting pins for improved bandwidth," *IEEE Antennas and Wireless Propagation Letters*, Vol. 5, pp. 217-219, 2006.
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